

WHAT IS CLAIMED IS:

1. A single-crystalline film having a molecular alignment order provided through phase transition from a liquid crystal phase.

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2. A single-crystalline film according to Claim 1, wherein the liquid crystal phase includes a lower order liquid crystal phase and a higher order liquid crystal phase.

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3. A single-crystalline film according to Claim 1, wherein the liquid crystal phase includes a smectic phase.

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4. A single-crystalline film according to Claim 3, comprising a smectic liquid crystal material providing a uniform molecular alignment in a smectic layer.

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5. A single-crystalline film according to Claim 4, wherein the smectic liquid crystal material has a molecular structure which is symmetrical with respect to its molecular long axis.

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6. A process for producing a single-crystalline film, comprising:

a step of disposing a smectic liquid crystal

material exhibiting a uniform molecular alignment in a smectic layer between a pair of boundaries having a thickness regulation function, and

5 a crystallization step of cooling and
solidifying the smectic liquid crystal material
through its smectic phase into a single-crystalline
film.

7. A process according to Claim 6, wherein the
10 smectic liquid crystal material has a molecular
structure which is symmetrical with respect to its
molecular long axis.

8. A process according to Claim 6, wherein the
15 crystallization step includes sub-steps of once
forming a poly-crystal state by causing phase
transition from a liquid crystal phase and
transforming the polycrystal state into a single
crystal state.

20 9. A process according to any one of Claims 6 -
8, wherein the crystallization step includes sub-steps
of once cooling the liquid crystal material into a
crystal phase and holding the liquid crystal material
25 for a prescribed period at a temperature which is in
proximity to a crystal-liquid crystal transition
temperature within the crystal phase temperature range.